

PTO 09-0928

CC=JP
DATE=20010130
KIND=A
PN=0126860

CO-PT-B-BASED TARGET AND ITS PRODUCTION
[CO-PT-B-KEI TAAGETTO OYOBI SONO SEIZO HOHO]

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UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. NOVEMBER 2008
TRANSLATED BY: SCHREIBER TRANSLATION INC.

PUBLICATION COUNTRY	(10):	JP
DOCUMENT NUMBER	(11):	0126860
DOCUMENT KIND	(12):	A
PUBLICATION DATE	(43):	20010130
APPLICATION NUMBER	(21):	11200401
APPLICATION DATE	(22):	19990714
INTERNATIONAL CLASSIFICATION	(51):	C 23 C 14/34 ; C 22 C 19/07 ; H 01 F 41/18 ; //G 11 B 5/851
PRIORITY COUNTRY	(33):	
PRIORITY NUMBER	(31):	
PRIORITY DATE	(32):	
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DESIGNATED CONTRACTING STATES	(81):	
TITLE	(54):	CO-PT-B-BASED TARGET AND ITS PRODUCTION
FOREIGN TITLE	[54A]:	CO-PT-B-KEI TAAGETTO OYOBI SONO SEIZO HOHO

[Claim]

[Claim 1]

A Co-Pt-B-based target having a content of $10 \geq B \geq 1$ at %, $30 \geq Pt \geq 5$ at % and the balance made up substantially of Co, the invention characterized as having an average crystal grain size of $50 \mu\text{m}$ and under, and the boride which is present in the composition is dispersed in layers when the target is seen in cross-section;

[Claim 2]

A Co-Pt-B-based target as described in Claim 1 characterized as having a content of $30 \geq Cr \geq 10$ at %;

[Claim 3]

A Co-Pt-B-based target as described in Claim 1 or Claim 2 characterized as containing $7 \geq Ta \geq 0$ at %;

[Claim 4]

A Co-Pt-B-based target as described in Claim 1 through Claim 3 characterized as having a content of $30 \geq Ni \geq 5$ at %;

[Claim 5]

A Co-Pt-B-based target as described in any of Claims 1 through 4 characterized as having a content of $5 \geq (Ti + Zr + Hf + V + Nb + Mo + W + Cu + Ag + Au) > 0$ at %;

[Claim 6]

A method of producing a Co-Pt-B-based target characterized as hot rolling a material made up of $10 \geq B \geq 1$ at %, $30 \geq Pt \geq 5$ at % with the balance made up mainly of Co, wherein the average crystal grain size of the matrix is not more than $50 \mu m$ and which disperses the boride present in the texture to form a layer when the target is seen in cross-section;

[Claim 7]

A method of producing a Co-Pt-B-based target as described in Claim 6 wherein the target to be produced has a content of $30 \geq Cr \geq 10$ at %;

[Claim 8]

A method of producing a Co-Pt-B-based target as described in Claim 6 or Claim 7 wherein the target to be produced has a content of $7 \geq Ta \geq 0$ at %;

[Claim 9]

A method of producing a Co-Pt-B-based target as described in any of Claims 6 through 8 wherein the target to be produced has a content of $30 \geq Ni \geq 5$ at %;

[Claim 10]

A method of producing a Co-Pt-B-based target as described in any of Claims 6 through 9 wherein the target

to be produced has a content of $5 \geq (\text{Ti} + \text{Zr} + \text{Hf} + \text{V} + \text{Nb} + \text{Mo} + \text{W} + \text{Cu} + \text{Ag} + \text{Au}) >)$ at %;

[Claim 11]

A method of producing a Co-Pt-B-based target as described in any of Claims 6 through 10 characterized as having a hot rolling temperature of between 1100°C to 800°C;

[Claim 12]

A method of producing a Co-Pt-B-based target as described in any of Claims 6 through 11 characterized as carrying out heat treatment of at least 1 hour at a temperature of between 1100°C to 800°C before the hot rolling.

[Detailed Description of Invention]

[0001]

[Technical Field]

The present invention relates to a Co-Pt-B-based target used to form a magnetic coating on a magnetic recording medium for use in magnetic disk devices and the like and a method for producing same.

[0002]

[Prior Art]

Prior-art Co-based magnetic films have been developed so that they can carry out high-density magnetic recording and Ta and Pt have been added to the Co-based magnetic film. Recently, it has been reported in the Journal of Applied Physics, 84, 6202 (1998) and elsewhere that the magnetic properties can be significantly improved by adding B to a Co-based magnetic film.

[0003]

[Problems Which the Present Invention is Intended to Solve]

When the inventors studied Co-based magnetic films to which B had been added as indicated above, they confirmed that the magnetic properties had been significantly improved in a Co-based magnetic film to which Pt had been added. The sputtering method and other methods disclosed in the abovementioned documents and elsewhere can be used to produce this Co-Pt-B-based magnetic film. The sputtering method requires a target which is a source of supplying the composition of the film.

[0004]

The inventors studied production of targets used to form Co-Pt-B-based magnetic films. Therefore, when a Co-Pt-B-based melting · casting target was used, there were

problems in that there were dispersions in the properties of the magnetic films produced. The melting · casting target has considerably fine chill crystals, is coarse and is formed of columnar crystal which depends on the cooling direction and is formed of equi-axed crystals which have a certain degree of fineness. It was confirmed that the crystal grain size is large and not uniform. The fact that the crystal grain size is large and not uniform confirms that these are the cause of the dispersions in the properties of the magnetic film. Therefore, it is an object of the present invention to provide a target used to form a Co-Pt-B-based magnetic film and to provide a method of producing a target with fine crystal grain size.

[0005]

[Means Used to Solve the Problems]

After studying the matter, the inventors found that the problem in which dispersions occurred in the properties of the magnetic film when a Co-Pt-B-based melting · casting target was used depended on the presence of coarse crystals. Therefore, the inventors studied means of preventing the formation of coarse crystals confirmed in the casting target. They found that hot rolling could be carried out even when using a Co-Pt-B-based raw material

with large amounts of boride even with B content of at least 1 at %. Thus, the texture obtained by hot rolling can have a fine crystal grain size and the boride can be dispersed and a thin film can be obtained having few dispersions in the magnetic holding properties and other properties of the film and they achieved the present invention.

[0006]

This means that the present invention is a Co-Pt-B-based target characterized as having a content of $10 \geq B \geq 1$ at %, $30 \geq Pt \geq 5$ at % with the balance made up mainly of Co; the average grain size of the matrix is not more than

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50 μm and the boride present in the texture is dispersed so that it is formed like a layer when seen in cross-section. The present invention should contain $30 \geq Cr \geq 10$ at %, $7 \geq Ta \geq 0$ at %, $30 \geq Ni \geq 5$ at % as well as $5 \geq (Ti + Zr + Hf + V + Nb + Mo + W + Cu + Ag + Au) > 0$ at % either respectively or in a complex.

[0007]

The production method in the present invention is used to provide a target having the abovementioned composition.

Hot rolling is carried out on a raw material containing $10 \geq B \geq 1$ at %, $30 \geq Pt \geq 5$ at % with the balance consisting mainly of Co, the average crystal grain size of the matrix is not more than $50 \mu m$ and the boride present in the texture is dispersed in a layer when the target is seen in cross-section. In the production method in the present invention, the raw material should contain $30 \geq Cr \geq 10$ at %, $7 \geq Ta \geq 0$ at %, $30 \geq Ni \geq 5$ at % as well as $5 \geq (Ti + Zr + Hf + V + Nb + Mo + M + Cu + Ag + Au) > 0$ at % respectively or in a complex. In the production method in the present invention, the hot-rolling temperature should be particularly $1100^{\circ}C$ to $800^{\circ}C$. In addition, depending on the case, heat treatment for at least one hour at a temperature ranging from $1100^{\circ}C$ to $800^{\circ}C$ before hot rolling is effective.

[0008]

[Mode of Working the Invention]

The greatest characteristic of the present invention is that that dispersions in the melting · casting target containing large amounts of boride can be handled by hot rolling to a degree unthinkable in the prior art, the crystal grain size can be made finer and the boride can be dispersed.

[0009]

In studies carried out by the inventors, the melting casting target was such that the texture during agglomeration remained on the target as is and the texture was characterized by crystal orientation that was aligned on large areas much like columnar crystals. When sputtering is carried out, the way in which the sputtered grains fly out is a function of the crystal orientation. The crystal grain size on the melting casting target is coarse and not uniform so that dispersions in the properties of the magnetic film were confirmed and attempts were made to reduce the dispersions in the properties of the magnetic film by making the crystal grain size of the matrix finer.

[0010]

The inventors studied production of a uniform raw material by making the crystal grain size finer by hot rolling on a Co-Pt-B-based alloy having poor hot rolling processing properties and dispersing the boride. As a result, B which had been added formed virtually only a boride with virtually no solid solution of B on the Co, the boride formed was extremely brittle and the hot rolling processing properties declined to an extreme so that when

the temperature was too low, hot rolling could not be carried out. In addition, eutectic crystals manifested at around 1150°C so that the temperature during hot rolling did not rise above that of the eutectic crystal temperature. They found that because of this, the hot rolling processing conditions for the Co-based alloy to which B had been added and particularly to which B had been added at more than 1 at % had to be rigorously controlled.

[0011]

Therefore, the inventors made it possible to roll a Co-Pt-B-based alloy having poor heat treatment properties by controlling the operating temperature during hot rolling within a range of 1100°C, where no eutectic crystals manifested, to 800°C which is the lowest temperature at which hot rolling can be carried out. It was also confirmed to be a new composition regulated by the present invention wherein the average crystal grain size of the abovementioned matrix could be made finer to 50 μm and under and the boride present in the composition could be dispersed to layers when the target was seen in cross-section. They also found that the dispersions in the properties of the magnetic film could be virtually eliminated by using this type of composition.

[0012]

In addition, the amount of B used was somewhat high and Ta and the like were added so that the hot rolling properties declined. In this case, by adding heat treatment of at least 1 hour in a temperature range ranging from 1100°C to 800°C, the boride was dispersed and the hot rolling processing properties were improved so that it was effective in improving the hot rolling processing properties. Although a long heat treatment time and a high treatment temperature are effective, the hot rolling processing properties can be significantly improved over those when the casting properties are used as is by carrying out hot rolling at 1100°C to 800°C for at least one hour. Furthermore, when the hot rolling direction in the present invention is changed during hot rolling, a target with little anisotropy is produced making this preferable. The reason why the parameters of the target composition should be $10 \geq B \geq 1$ at %, $30 \geq Pt \geq 5$ at %, with the balance mainly of Co and $30 \geq Cr \geq 10$ at %, $7 \geq Ta > 0$ at %, $30 \geq Ni \geq 5$ at % and $5 \geq (Ti + Zr + Hf + V + Nb + Mo + W + Cu + Ag + Au) > 0$ at % is because when the lower limit amount is not added, the respective effects do not manifest. In addition, when more than the upper limit is

added, the adverse effect caused by the adding effect increases.

[0013]

Adding B has the effect of segregating to the grain boundary in the film and there is the effect of segregating the Pt element inside the grain. These effects are conspicuous when 1 at % or more is added. In addition, adding Pt increases the magnetic anisotropy by forming a solid solution in Co and there is the effect of increasing the coercive force of the film. Pronounced effects appear in the increase in the coercive force by adding 5 at % or above. In addition, adding more than 30 at % significantly lowers the inherent properties of the Co so that 30 \geq Pt \geq 5 at % was used.

[0014]

Adding Cr causes segregation toward the grain boundary in the film and the grain boundary is made non-magnetic so that there is the effect of magnetically segmenting the ferromagnetic Co grains. When less than 10 at % is added, the magnetism of the film itself is lowered too much so that this was made 30 \geq Cr \geq 10 at %. Adding Ta has the

effect of making the film crystal grain size finer and the effect in which the Cr and other non-magnetic elements

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segregate toward the grain boundary. These effects are seen even when small amounts are added. Conversely, adding more than 7 at % lowers the magnetization of the film and is undesirable so that this was made $7 \geq \text{Ta} \geq 0$ at %.

[0015]

Adding Ni has the effect of increasing the magnetic anisotropy by making a solid solution in the Co and increasing the coercive force of the film. There is a pronounced effect in the increase in coercive force by more than 5 at % is added. In addition, when more than 30 at % is added, there is a significant decline in the inherent properties of the Co so that this was made $30 \geq \text{Ni} \geq 5$ at %. Adding small amounts of elements Ti, Zr, Hf, V, Nb, Mo, W, Cu, Ag and Au made it possible to improve the magnetic properties. When the total amount exceeded 5 at %, the magnetic properties and the crystal properties of the film were noticeably damaged so that this was made $5 \geq (\text{Ti} + \text{Zr} + \text{Hf} + \text{V} + \text{Nb} + \text{Mo} + \text{W} + \text{Cu} + \text{Ag} + \text{Au}) > 0$ at %.

[0016]

[Practical Example]

(Practical Example 1) We produced ingots of Co-10 Pt-5B (at %), Co-20 Cr-10Pt-5B (at %), Co-20 Cr-10 Pt-5B-1 Ta (at %), Co-20 Cr-10 Pt-10 Ni-5B (at %), Co-20 Cr-10 Pt-5B-1 Ti (at %), Co-20 Cr-10 Pt-5B-1NB (at %), Co-20 Cr-10 Pt-5B-1 Mo (at %) and Co-20 Cr-10 Pt-5B-1 Cu (at %) and carried out hot rolling of the respective ingots under the conditions indicated in Table 1.

[0017]

[Table 1]

Hot Rolling Conditions	Upper Limit Temperature (°C)	Lower Limit Temperature (°C)
Conditions 1	1150	1000
Conditions 2	1100	1000
Conditions 3	1100	900
Conditions 4	1100	800
Conditions 5	1100	700
Conditions 6	1000	800
Conditions 7	1000	700
Conditions 8	900	800
Conditions 9	900	700
Conditions 10	800	700

[0018]

However, it should be noted that the hot rolling involved processing from a 40 mm thick ingot to 8 mm thick ingots. When the temperature declined to the lower limit temperature indicated in Table 1, heating was again carried out at the upper limit temperature. In addition, the draft for a single rolling was 10 % and under and rolling was carried out up to the prescribed thickness while changing the rolling direction. In addition, Tables 2 through 4 indicate the condition of the cracks occurring as a result of hot rolling (no cracks formed: O; cracks formed: X). In addition, Tables 5 and 6 indicate the condition (no cracks formed: O; cracks formed: X) of the cracks occurring as a result of hot rolling of ingots Co-10Pt-5B (at %), Co-20 Cr-10 Pt-5B (at %) and Co-20 Cr-10Pt-5B-1Ta (at %) which were hot-rolled respectively for 1 hour at 900°C and for 5 hours at 1000°C. It was found that when contrasted with Tables 2 through 4 and Table 5 and Table 6, heat treatment before hot rolling inhibited formation of cracks during hot rolling and the processing properties were improved.

[0019]

[Table 2]

/5

組成	圧延条件	割れ
Co-10Pt-5B (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	○
	条件7	×
	条件8	×
	条件9	×
	条件10	×
Co-20Cr-10Pt-5B (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	×
	条件7	×
	条件8	×
	条件9	×
	条件10	×
Co-20Cr-10Pt-5B-1Ta (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	×
	条件5	×
	条件6	×
	条件7	×
	条件8	×
	条件9	×
	条件10	×

[captions]

1: Composition; 2: Rolling Conditions; 3: Cracks; 4:
Conditions 1; 5: Conditions 2; 6: Conditions 3; 7:
Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:
Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:
Conditions 10.

[0020]

[Table 3]

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組成	圧延条件	割れ
Co-20Cr-10Pt-10Ni-5B (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	×
	条件7	×
	条件8	×
	条件9	×
	条件10	×
Co-20Cr-10Pt-5B-1Ti (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	×
	条件7	×
	条件8	×
	条件9	×
	条件10	×
Co-20Cr-10Pt-5B-1Nb (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	×
	条件5	×
	条件6	×
	条件7	×
	条件8	×
	条件9	×
	条件10	×

1: Composition; 2: Rolling Conditions; 3: Cracks; 4:
 Conditions 1; 5: Conditions 2; 6: Conditions 3; 7:
 Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:

Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:
Conditions 10.

[0021]

[Table 4]

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1 1	1 2	
組成	圧延条件	割れ
Co-20Cr-10Pt-5B-1Mo (at%)	条件 1	×
	条件 2	○
	条件 3	○
	条件 4	○
	条件 5	×
	条件 6	×
	条件 7	×
	条件 8	×
	条件 9	×
	条件 10	×
Co-20Cr-10Pt-5B-1Cu (at%)	条件 1	×
	条件 2	○
	条件 3	○
	条件 4	○
	条件 5	×
	条件 6	×
	条件 7	×
	条件 8	×
	条件 9	×
	条件 10	×

1: Composition; 2: Rolling Conditions; 3: Cracks; 4:
Conditions 1; 5: Conditions 2; 6: Conditions 3; 7:

Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:

Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:

Conditions 10.

[0022]

[Table 5]

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組成	圧延条件	割れ
Co-20Cr-10Pt-5B-1Mo (at%)	条件 1	×
	条件 2	○
	条件 3	○
	条件 4	○
	条件 5	×
	条件 6	×
	条件 7	×
	条件 8	×
	条件 9	×
	条件 10	×
Co-20Cr-10Pt-5B-1Cu (at%)	条件 1	×
	条件 2	○
	条件 3	○
	条件 4	○
	条件 5	×
	条件 6	×
	条件 7	×
	条件 8	×
	条件 9	×
	条件 10	×

1: Composition; 2: Rolling Conditions; 3: Cracks; 4:
Conditions 1; 5: Conditions 2; 6: Conditions 3; 7:
Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:
Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:
Conditions 10.

[0023]

[Table 6]

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組成	圧延条件	割れ
Co-10Pt-5B (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	○
	条件7	×
	条件8	○
	条件9	×
	条件10	×
Co-20Cr-10Pt-5B (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	○
	条件7	×
	条件8	○
	条件9	×
	条件10	×
Co-20Cr-10Pt-5B-1Ta (at%)	条件1	×
	条件2	○
	条件3	○
	条件4	○
	条件5	×
	条件6	○
	条件7	×
	条件8	○
	条件9	×
	条件10	×

1: Composition; 2: Rolling Conditions; 3: Cracks; 4: Conditions 1; 5: Conditions 2; 6: Conditions 3; 7: Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:

Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:
Conditions 10.

[0024]

Average crystal grain sizes which measured the crystal grain size of the matrix of the target material obtained in Table 2 through Table 6 are indicated in Table 7 and Table 8. Furthermore, in Table 7 and Table 8, measurements were carried out for those materials where no cracks were formed. In addition, the microtexture of the raw material after hot-rolling and in its cast state for the Co-20Cr-10Pt-5 B (at %) as the microtexture which applied the typical hot rolling of the target in the present invention is indicated in Figure 1 and Figure 2 and the microtexture of the raw material after hot-rolling and in its cast state for the Co-20Cr-10Pt-5B-1Ta (at %) is indicated in Figure 3 and Figure 4. However, it should be noted that observation was made when seen in cross-section. It can be seen from the microtexture in Figures 1 through 4 that the raw material which was hot-rolled was such that recrystallization occurred on the matrix, the crystal grain size was narrowed, and that the boride present in the composition had dispersed in layers when the target was seen in cross-section.

[0025]

[Table 7]

/10

组成	压延条件	平均结晶粒径 (μm)
Co-10Pt-5B (at%)	条件2	38
	条件3	22
	条件4	20
	条件6	21
Co-20Cr-10Pt-5B (at%)	条件2	30
	条件3	19
	条件4	17
Co-20Cr-10Pt-5B-1Ta (at%)	条件2	32
	条件3	16
Co-20Cr-10Pt-10Ni-5B (at%)	条件2	38
	条件3	21
	条件4	18
Co-20Cr-10Pt-5B-1Ti (at%)	条件2	30
	条件3	18
	条件4	15
Co-20Cr-10Pt-5B-1Nb (at%)	条件2	32
	条件3	16
Co-20Cr-10Pt-5B-1Mo (at%)	条件2	40
	条件3	22
	条件4	21
Co-20Cr-10Pt-5B-1Cu (at%)	条件2	31
	条件3	20
	条件4	19

1: Composition; 2: Rolling Conditions; 3: Cracks; 4:

Conditions 1; 5: Conditions 2; 6: Conditions 3; 7:

Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:

Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:

Conditions 10.

[0026]

[Table 8]

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組成	圧延条件	平均結晶粒径 (μm)
Co-10Pt-5B (at%) 900℃×1h	条件2	40
	条件3	22
	条件4	23
	条件6	24
Co-20Cr-10Pt-5B (at%) 900℃×1h	条件2	32
	条件3	20
	条件4	21
Co-20Cr-10Pt-5B-1Ta (at%) 900℃×1h	条件2	30
	条件3	17
	条件4	18
Co-10Pt-5B (at%) 1000℃×5h	条件2	41
	条件3	25
	条件4	20
	条件6	22
	条件8	21
Co-20Cr-10Pt-5B (at%) 1000℃×5h	条件2	30
	条件3	21
	条件4	19
	条件6	23
	条件8	22
Co-20Cr-10Pt-5B-1Ta (at%) 1000℃×5h	条件2	32
	条件3	16
	条件4	17
	条件6	16
	条件8	14

1: Composition; 2: Rolling Conditions; 3: Cracks; 4:
Conditions 1; 5: Conditions 2; 6: Conditions 3; 7:
Conditions 4; 8: Conditions 5; 9: Conditions 6; 10:
Conditions 7; 11: Conditions 8; 12: Conditions 9; 13:
Conditions 10.

[0027]

(Practical Example 2)

We formed a film using a Co-20Cr-10Pt-5B (at %) target having different average crystal grain sizes on the matrix as indicated in Table 9 under conditions of: a substrate temperature of 150°C, Ar pressure of 0.66 Pa, DC electric power of 500W, on top of a substrate using a substrate on which a Cr under coating film had been formed by sputtering on top of an Al substrate which had been subjected to NiP plating. We produced a film substrate for which the total film forming time was from 1 hour to 5 hours at 1 hour intervals in order to study the dispersions in the properties of the magnetic film. Results of measuring the coercive power H_c measured using a VSM (vibration sample magnetometer) are indicated in Table 10. However, it should be noted that in Table 10, the coercive force of Sample 1 for 1 hour was an absolute value of 100. We used targets having different average crystal grain sizes which included

target material which had been produced by processing using the same composition as during casting as well as target material in its hot rolled state wherein the crystal grain growth was promoted by heat treatment after hot rolling and the crystal grain size was increased.

[0028]

We measured the average crystal grain size measured using the cutting method on the respective targets. However, it should be noted that the raw material in its cast state was such that the crystal grain boundary was not observed in the matrix in the dendrite texture so that the crystal grain size could not be measured. In addition, Table 9 indicates the dispersion state of the boride when the target is seen in cross-section. Representation of the dispersed state is as follows. The layer state is the texture based on Figure 1 and Figure 3; the random state is the texture based on Figure 2 and Figure 4. It can be seen from Table 10 that the target with the texture in its cast state has great dispersions during film formation and that the targets having fine crystal grain size on the matrix have few dispersions in the properties of the magnetic film.

[0029]

[Table 9]

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Sample	Average Crystal Grain Size (μm)	Boride dispersion state	Process	Remarks
1	17	Layer	As is in hot rolled state	The present invention
2	30	Layer	As is in hot rolled state	The present invention
3	48	Layer	After hot rolling → heat treatment	The present invention
4	75	Layer	After hot rolling → heat treatment	Comparative Example
5	120	Layer	After hot rolling → heat treatment	Comparative Example
6	Could not be measured	Random	As is in cast state	Comparative Example

[0030]

[Table 10]

	1 hour	2 hours	3 hours	4 hours	5 hours
Sample 1	100	102	102	98	100
Sample 2	100	101	100	102	98
Sample 3	98	99	103	100	102
Sample 4	97	104	102	99	103
Sample 5	105	96	96	102	103

Sample 6	90	95	110	100	90
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[0031]

[Effect of Invention]

The present invention is a technique which is indispensable for magnetic recording media and provides a stable supply of Co-Pt-B-based targets which inhibit the dispersions in the magnetic properties of Co-Pt-B-based magnetic films of magnetic recording media used to magnetic disk devices and the like.

[Brief Explanation of Figures]

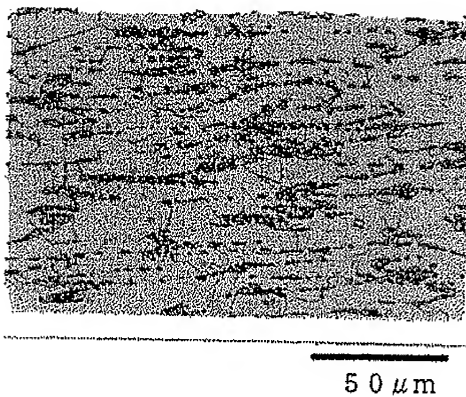
[Figure 1] A microphotograph of the microtexture of Co-20Cr-10Pt-5B (at %) having a typical texture for the target in the present invention.

[Figure 2] A microphotograph of the microtexture of Co-20Cr-10Pt-5B (at %) having a typical texture for the target in the comparative example.

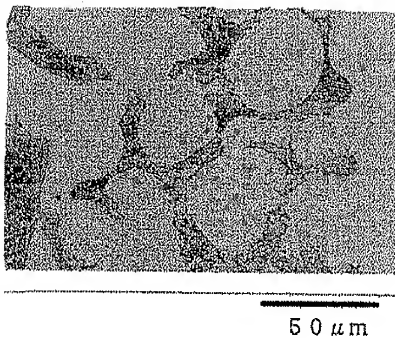
[Figure 3] A microphotograph of the microtexture of Co-20Cr-10Pt-5B-1Ta (at %) having a typical texture for the target in the present invention

[Figure 4] A microphotograph of the microtexture of the Co-20Cr-10 Pt-5B-1Ta (at %) having a typical texture for the target in the comparative example.

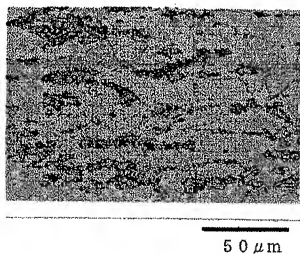
[Figure 1]



[Figure 2]



[Figure 3]



[Figure 4]

